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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/648,950	08/26/2003	Michael Kozhukh	42390.P13296D	4073

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BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN LLP
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EXAMINER

YEVSIKOV, VICTOR V

ART UNIT	PAPER NUMBER
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2891

DATE MAILED: 04/01/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

AK

Office Action Summary	Application No.	Applicant(s)	
	10/648,950	KOZHUKH ET AL.	
	Examiner	Art Unit	
	Victor V. Yevsikov	2829	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 August 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-9 and 24-30 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-9 and 24-30 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 August 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>8/26/03</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-9, 25, 26 and 28-30 are rejected under 35 U.S.C. 102(b) as being anticipated by Gelatose et al. (US 5,391,517), cited by applicant.

With respect to claims 1-9, 25 and 26 Gelatose teaches a method for manufacturing interconnect structure comprising:

providing a device substrate 10 having a dielectric layer 12 thereon;

removing a portion of the dielectric layer to create an opening 14;

forming an interface layer 22 within the opening;

forming a silver or Cu or Al or Au (col. 1, lines 41-44) layer 24 overlying the interface layer; and

annealing the substrate to form an intermetallic layer 26 between the silver layer and the interface layer, in which the silver layer is in intimate contact with the intermetallic layer and wherein

removing portion of the silver layer, intermetallic layer, and the interface layer overlying the dielectric layer to form a smooth surface (fig. 5);

the interface layer comprises an adhesion layer and a diffusion barrier layer overlying the adhesion layer (fig. 2.);

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the diffusion barrier layer 18 comprises titanium nitride;

the adhesion layer 16 comprises titanium;

the interface layer and silver layer are formed using sputter deposition process (col. 3, lines 61-68; col. 5, lines 14-20);

the substrate is annealed at an ambient temperature of approximate 400 degree Celsius for a period of approximate one hour (col. 5, lines 35-40).

the removing comprises a chemical-mechanical-polishing (CMP) process (col.5, lines 60-67).

Reference: figs. 1 – 5 with corresponding text; col.1, lines 41-44.

With respect to claims 28-30 Gelatose teaches an interconnect structure comprising:

a device substrate 10;

a dielectric layer 12 overlying the device substrate, the dielectric layer having a cavity 14 therein;

an interface layer 22 overlying the dielectric layer, the interface layer having a thickness insufficient to completely fill the cavity 14; and

a silver layer 24 overlying the interface layer, the silver layer having a thickness sufficient to completely fill the cavity and wherein the interface layer comprises an adhesion layer (Ti) 16 and a diffusion barrier layer (TiN) 18 overlying the adhesion layer.

Reference: figs. 1 – 5 with corresponding text; col.1, lines 41-44.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 24 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gelatose in view of Kwon et al. (US 6,333,260 B1).

Gelatose teaches the features detailed previously but lack a discussion on method wherein:

a protection layer overlying the silver layer; and

a dielectric layer overlying the protection layer.

However, Kwon teach the method wherein:

a protection layer (Ti, TaN) 350 overlying the metal layer; and

a dielectric layer 360 overlying the protection layer.

Therefore, it would have been obvious to one of ordinary skill in the art to use protection Ti or TiN layer and dielectric layer for finishing interconnect structure as taught by Gelatose / Kwon.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Victor Yevsikov whose telephone number is (571) 272-1910. The examiner can normally be reached on Monday –Thursdays 8:00-5:30.

If attempts to reach the examiner by telephone are unsuccessful, examiner's supervisor, William B. Baumeister, can be reached on (571) 272-1722. The fax phone

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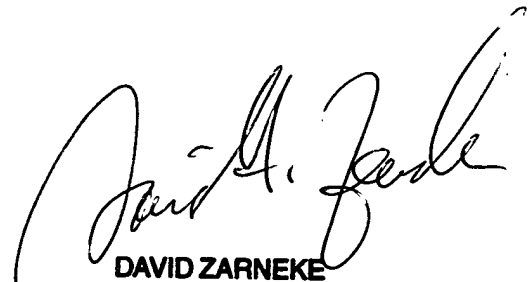
numbers for the organization where this application or processing is assigned is (703) 873-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published application may be obtained from either Private PAIR or Public PAIR. Status information for unpublished application is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Victor Yevsikov
Examiner
Art Unit 2829

March 23, 2005



DAVID ZARNEKE
PRIMARY EXAMINER
3/30/05